3 photosensitive substrate, comprising a catadioptric optical

4 system according to Claim 29 which projects a predetermined

5 pattern on a mask onto a photosensitive substrate.

1   62.(Amended)   A projection exposure apparatus which

2 projects a predetermined pattern on a mask onto a

3 photosensitive substrate, comprising a catadioptric optical

4 system according to Claim 51 which projects a predetermined

5 pattern on a mask onto a photosensitive substrate.

Please add the following new claims:

1   63.(New)   A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3 Claim 18; and

4   projecting an image of a predetermined pattern on a mask

5 onto a photosensitive substrate using the catadioptric

6 optical system.

1   64.(New)   A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3 Claim 29; and

4   projecting an image of a predetermined pattern on a mask

5   onto a photosensitive substrate using the catadioptric

6   optical system.

1   65.(New) A projection exposure apparatus which projects

2   a predetermined pattern on a mask onto a photosensitive

3   substrate, comprising a catadioptric optical system according

4   to Claim 30 which projects a predetermined pattern on a mask

5   onto a photosensitive substrate.

1   66.(New) A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3   Claim 30; and

4   projecting an image of a predetermined pattern on a mask

5   onto a photosensitive substrate using the catadioptric

6   optical system.

1   67.(New) A projection exposure apparatus which projects

2   a predetermined pattern on a mask onto a photosensitive

3   substrate, comprising a catadioptric optical system according

4   to Claim 31 which projects a predetermined pattern on a mask

5   onto a photosensitive substrate.

1   68.(New)   A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3   Claim 31; and

4   projecting an image of a predetermined pattern on a mask

5   onto a photosensitive substrate using the catadioptric

6   optical system.

1   69.(New)   A projection exposure apparatus which projects

2   a predetermined pattern on a mask onto a photosensitive

3   substrate, comprising a catadioptric optical system according

4   to Claim 33 which projects a predetermined pattern on a mask

5   onto a photosensitive substrate.

1   70.(New)   A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3   Claim 33; and

4   projecting an image of a predetermined pattern on a mask

5   onto a photosensitive substrate using the catadioptric

6   optical system.

1   71.(New)   A projection exposure apparatus which projects

2   a predetermined pattern on a mask onto a photosensitive

3   substrate, comprising a catadioptric optical system according

4   to Claim 34 which projects a predetermined pattern on a mask

5   onto a photosensitive substrate.

1   72.(New) A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3   Claim 34; and

4   projecting an image of a predetermined pattern on a mask

5   onto a photosensitive substrate using the catadioptric

6   optical system.

1   73.(New) A projection exposure apparatus which projects

2   a predetermined pattern on a mask onto a photosensitive

3   substrate, comprising a catadioptric optical system according

4   to Claim 35 which projects a predetermined pattern on a mask

5   onto a photosensitive substrate.

1   74.(New) A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3   Claim 35; and

4   projecting an image of a predetermined pattern on a mask

5   onto a photosensitive substrate using the catadioptric

6   optical system.

1   75.(New)   A catadioptric optical system according to

2   Claim 51, wherein the catadioptric optical system has both-

3   side telecentricity.

1   76.(New)   A projection exposure apparatus which projects

2   a predetermined pattern on a mask onto a photosensitive

3   substrate, comprising a catadioptric optical system according

4   to Claim 75 which projects a predetermined pattern on a mask

5   onto a photosensitive substrate.

1   77.(New)   A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3   Claim 75; and

4   projecting an image of a predetermined pattern on a mask

5   onto a photosensitive substrate using the catadioptric

6   optical system.

1   78.(New)   A projection exposure apparatus which projects

2   a predetermined pattern on a mask onto a photosensitive

3   substrate, comprising a catadioptric optical system according

4   to Claim 37 which projects a predetermined pattern on a mask

5   onto a photosensitive substrate.

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1   79.(New) A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3   Claim 37; and

4   projecting an image of a predetermined pattern on a mask

5   onto a photosensitive substrate using the catadioptric

6   optical system.

1   80.(New) A catadioptric optical system according to

2   Claim 38, wherein the catadioptric type optical system

3   includes a lens group having at least one positive lens, and

4   the refraction type optical system includes an aperture

5   diaphragm.

1   81.(New) A catadioptric optical system according to

2   Claim 38, wherein the catadioptric type optical system

3   includes a lens group having at least one lens element whose

4   surface is aspherical, and the refraction type optical system

5   includes at least one lens element whose surface is

6   aspherical.

1   82.(New) A projection exposure apparatus which projects

2   a predetermined pattern on a mask onto a photosensitive

3   substrate, comprising a catadioptric optical system according

4   to Claim 38 which projects a predetermined pattern on a mask

5   onto a photosensitive substrate.

1   83.(New) A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3   Claim 38; and

4   projecting an image of a predetermined pattern on a mask

5   onto a photosensitive substrate using the catadioptric

6   optical system.

1   84.(New) A projection exposure method comprising:

2   preparing a catadioptric optical system according to

3   Claim 51; and

4   projecting an image of a predetermined pattern on a mask

5   onto a photosensitive substrate using the catadioptric

6   optical system.

1   85.(New) A reduction projection catadioptric optical

2   system for projection exposure, comprising:

3   at least one lens element and at least one mirror,

4   wherein all mirrors among the at least one mirror are

5   devoid of planar folding mirrors,

6   the reduction projection catadioptric optical system

8

7   further comprising an aperture diaphragm on an image side of

8   a most image-wise curved mirror.

1   86.(New) A reduction projection catadioptric optical

2   system according to Claim 85, wherein the reduction

3   projection catadioptric optical system has a numerical

4   aperture of 0.6 or more.

1   87.(New) A reduction projection catadioptric optical

2   system according to Claim 85, wherein there is a straight

3   axis of symmetry of all curvatures of all optical elements.

1   88.(New) A reduction projection catadioptric optical

2   system according to Claim 85, wherein the reduction

3   projection catadioptric optical system forms an intermediate

4   image, and wherein at least two mirrors are arranged upstream

5   of the intermediate image in an optical path.

1   89.(New) A reduction projection catadioptric optical

2   system according to Claim 85, further comprising a lens group

3   next to an object plane, wherein the reduction projection

4   catadioptric optical system has object-side telecentricity.